FINANCIAL PERFORMANCE EVALUATION OF REAL ESTATE COMPANIES IN MALAYSIA: A FUZZY LOGIC APPROACH

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Abstract

This paper aims to evaluate the financial performance of the property-related companies in Malaysia using a fuzzy logic approach and provide information of the companies to help investors in a share-investing decision. In this research, the companies in the real estate or property industry are prioritized based on their financial performance using a fuzzy logic approach. The algorithm for the proposed evaluation model consists of three steps: choosing the industries in Bursa Malaysia, choosing the right criteria to select and rank the company's stock and rank the companies. Finally, the indexes obtained are used to rank the companies. An algorithm is developed and demonstrated in a case study of data on the property industry taken from Bursa Malaysia in 2009. Findings of the research are discussed and future research is recommended.

Keywords: Fuzzy sets, data stream, financial performance, decision making, fuzzy number

Introduction

The stock market is the market where shares of public listed companies are traded. In Malaysia, there is no physical market for share trading since the transactions are conducted electronically. Bursa Malaysia which previously known as Kuala Lumpur Stock Exchange stands as a formal organisation dealing with shares. It is also a secondary market where shares are traded after being issued in the primary market.

Shares represent units of division of the ownership also one type of investment instrument available to the investors. Investing in share meaning that the investor own the company according to the amount invested. Therefore it is vital to understand the financial performance of a company before any investment decision made.

Both individual and institutional investors have wide range of Malaysian companies to invest in. Even Bursa Malaysia has categorise these public-listed companies into thirteen sectors. And, properties sector is one of them. For the first time in thirty years property values in Malaysia has rose about 30% to 40% in 2010. While, property market outlook expected that the value will rise at least 20% in 2011. On average, the price of the condominium rise between 60% and 100% between 2003 & 2008 compared to the rise in value of landed properties which rose as high as 40% in just one year. Essentially the recovery of Malaysian economy has stimulated not only the overall property sector but other sectors such as construction and finance sector.

Given these positive scenario of property market, some investors would like to add property-related shares in their investment portfolio. Still, financial aspect of the companies plays vital role to ensure good return on the investment.

Literature Review

There are two theories of analysis in share investing which are fundamental and technical analysis. Fundamental analysis is the belief that value of a stock is influenced by the performance of the company that issued the stock. In contrast, technical analysis is the study on share price movements.Typically, fundamental analysis starts by taking a comprehensive view of the economy, move to an individual industry, and finally the evaluation of a particular company.

In the company analysis phase, the investor studies the financial statements of the firm to learn its strengths and weaknesses, identify any underlying trends and developments, evaluate operating efficiencies, and gain general understanding of the nature and operating characteristics of the firm. Thus, financial performance especially financial statements are a vital part of company analysis. However, ratio analysis is used to evaluate financial performance of the companies since a single value on its own (financial statement alone) may not provide a fair comparison. Liquidity ratios, capital structure ratios, leverage ratios, profitability ratios and market ratios are examples of ratios that useful in analysing the companies financial performance (Gitman & Joehnk, 2008).

While, fuzzy logic is a term developed from fuzzy sets introduced by Lotfi A. Zadeh, a professor of computer science in 1965. The model developed by Zadeh converts the subjective values into objective values. A fuzzy set does not have specific and limited boundaries, but a degree of pertinence. Basically, fuzzy logic is a system of concepts, principles and methods of dealing with modes of reasoning that are approximate rather than exact. Thus, it is particularly good at handling uncertainty, vagueness and imprecision. In fuzzy logic the degree of truth of a statement can range between 0 and 1 and is not constrained to the two truth values {true, false} as in classic predicate logic (Constantin, 1995).

Feldman and Treleavan (1994) defined fuzzy logic as one of the intelligent systems in finance as well as neural networks, genetic algoriths and hybrid systems. The authors described the business sectors including asset forecasting, credit evaluation,. Fraud detection, portfolio optimization, risk assessment, economic modeling, sales forecasting and retail outlet location are benefiting from a whole new generation of 'intelligent' computing techniques. The authors also indicated that these intelligent systems outperformed traditional statistical approaches in many cases. Schwartz (1990) found that Japan was the leading country for the application of fuzzy techniques. To illustrate, many Japanese financial institutions including Yamaichi Securities and Nikko Securities were utilising fuzzy logic for portfolio management and for personal loan evaluation.

However, there are still very few studies conducted on utilising fuzzy logic in evaluating financial performance of companies. The most recent study was conducted by Tavakkoli *et al.,* (2010) on the drug industry in Iran. The authors developed three stages in the articles. First step was choosing the industry where the researchers used multi attribute decision making to rank the industries and chose the best industry. Second step was selecting criteria to choose and rank the company's stock. The final step was ranking the companies according to chosen indexes. Structured questionnaires were used to take viewpoints of stock market experts such as brokers, investment companies and university professors to come out with the 7 indexes. The selected indexes (criteria) were; quick ratio, return on equity (ROE), financial leverage index, debt ratio, return on investment (ROI), current ratio and price earning (P/E) ratio. The researchers then used fuzzy logic to evaluate and rank the companies according to the selective criteria.

Another study which bring forward the system of performance evaluation with method of fuzzy logic has been documented by Wei (2010). The author specified that the specific company's financial performance evaluation is also a fuzzy problem (for example, good, medium and poor). Thus, fuzzy logic can be used to solve the problem. Since the company's financial performance is distinctive in different countries, thus the study designed company's financial performance evaluation system should be based on fuzzy clustering analysis. Three steps involved; the first step is selection of the statistical indexes, second step is calibration and the third step is clustering. The maximum three methods are used in clustering analysis. With the fuzzy logic approach the companies are classified into good, medium and excellent range.

Research Questions

1. How was the financial performance of the companies in property sector for 2010?

2. Which company should the investor invest in?

Research Objectives

1. To evaluate the financial performance of companies in the property sector of Malaysia using fuzzy logic approach.

2. To suggest the investor on the company to invest according to the ranking of their financial performance.

Methodology

In this research we are going to prioritize companies in an industry based on their financial performance using fuzzy logic. The approach was adapted from Tavakkoli et al (2010). The algorithm for the proposed evaluation model consists of three steps (figure1). Step1: Choosing the industry. In this step, with attention to whole trend of industries in Malaysia and we use multi attribute decision making to rank the industries. So, we choose the best industry. Step 2: Choosing the right criteria to select and ranking the company's stock. Step 3: Appraisal and ranking the companies. According to chosen indexes we evaluate the companies and rank them
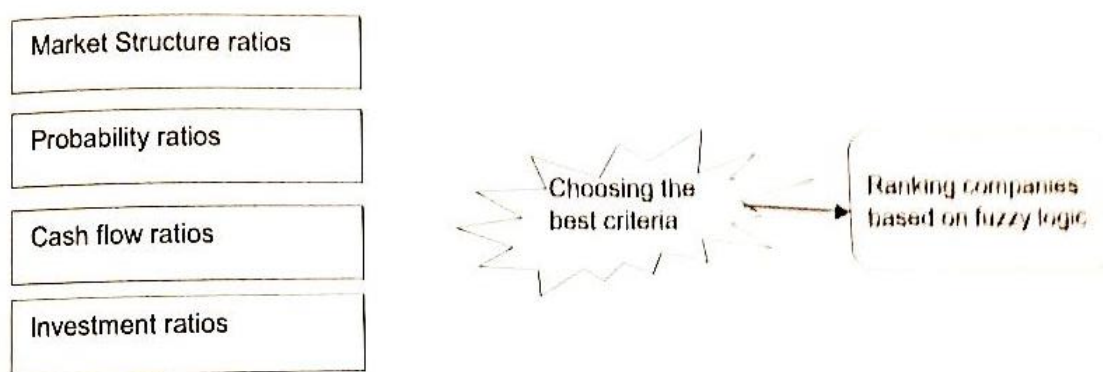

Figure 1: Proposed Model

Data on the property industry in Bursa Malaysia in 2009 has been used. Eighteen companies labeled as X_1, X_2, X_3... X_{18} used to decide their financial performances are shown in Table 1.

Table 1: Selected Companies and their codes

Name of Companies	Code
Bertam Alliance	X_1
Asas Dunia Berhad	X_2
Encorp Berhad	X_3
Equine Capital Berhad	X_4
Farlim Group	X_5
Hua yang Bhd	X_6
Ibraco Berhad	X_7
Keladi Maju Berhad	X_8
LBS Bina Group Berhad	X_9
Magna Prima Berhad	X_{10}
Mah Sing Group Berhad	X_{11}
Metro Kajang Holdings	X_{12}
Nilai resources	

Pasdec Holding	X_{14}
Plenitude Berhad	X_{15}
Tanco Holding Berhad	X_{16}
Tebrau Teguh Berhad	X_{17}
Triple Bhd	X_{18}

In this research we adapted 4 selected indexes from Tavakkoli *et al.* (2010) which are suitable for evaluating financial performance of property industry in Bursa Malaysia. Table 2 records the criteria and their type of fuzzy number used.

Table 2: Types of fuzzy logic and criteria

	Criteria	Type of Fuzzy Number	SUP(x)	Fuzzy Number
C_1	Quick ratio	Triangle	$X = 1$	$\begin{cases} x & 0 \leq x < 1 \\ 2-x & 1 \leq x < 2 \\ 0 & other \end{cases}$
C_2	ROE	Triangle	$0.7 \leq x < 1$	$\begin{cases} 1.42 & 0 \leq x < 0.7 \\ 1 & 0.7 \leq x < 1 \\ 0 & other \end{cases}$
C_3	ROI	Left-Triangle	$0.5 \leq x < 2$	$\begin{cases} 2x & 0 \leq x < 0.5 \\ 1 & 0.5 \leq x < 2 \\ 0 & other \end{cases}$
C_4	Current ratio	Trapezoid	$1 \leq x < 2$	$\begin{cases} x & 0 \leq x < 1 \\ 1 & 1 \leq x < 2 \\ 2-x & 2 \leq x < 3 \\ 0 & other \end{cases}$

Data

The data are obtained from Data Stream. We selected 18 companies from 83 companies. Table 3 shows several ratios for these companies during the year 2009.

Table 3: Name of company and their financial performance for year 2009

Name of Company	Quick ratio	Current ratio	Return on Enquiry (ROE)	Return on Invested Capital (ROI)
Bertam Alliance	0.4	2.17	3.04	3.2
Asas Dunia Berhad	0.61	4.59	3.38	3.31
Encorp Berhad	1.28	2.19	6.73	6.56
Equine Capital Berhad	0.59	0.91	-20.14	-10.79
Farlim Group	1.09	2.35	6.22	4.33
Hua yang Bhd	1.61	4.06	4.75	4.39
Ibraco Berhad	1.41	4.44	-5.34	-4.37

Keladi Maju Berhad	5.61	8.83	9.97	9.6
LBS Bina Group Berhad	0.72	1.1	-3.98	-0.1
Magna Prima Berhad	0.75	1.51	5.7	4.89
Mah Sing Group Berhad	1.08	2.7	12.28	9.64
Metro Kajang Holdings	1.19	1.98	6.57	5.98
Nilai resources	0.61	2.91	-3.17	-1.98
Pasdec Holding	1.35	3.55	-1.27	0.57
Plenitude Berhad	2.01	2.78	12.83	12.65
Tanco Holding Berhad	0.09	0.25	2.99	1.06
Tebrau Teguh Berhad	1.39	10.62	2.78	2.72
Triple Bhd	0.54	0.73	17.15	10.6

Result and Discussion

The ranking of the companies is presented in Table 4. The results are presented according to 6 characteristics which are; relevance, predictability, update, comparability, reliability, consistency (Yen, 1999; Aghion & Bolton, 1992). The results are presented in Table 5.

Table 4: Situation of each company according to selected indexes

Min	$\mu_G(x)$	ROI	$\mu_G(x)$	ROE	$\mu_G(x)$	Current Ratio	$\mu_G(x)$	Quick Ratio	Code Company
0.66	0.66	3.2	0.75	3.04	1.00	2.17	0.66	0.4	X_1
0.69	0.69	3.31	0.83	3.38	1.00	4.59	0.94	0.61	X_2
0.65	0.65	6.56	0.83	6.73	1.00	2.19	0.67	1.28	X_3
0.59	0.59	-10.79	0.82	-20.14	0.99	0.91	0.88	0.59	X_4
0.47	0.47	4.33	0.88	6.22	1.00	2.35	0.86	1.09	X_5
0.61	0.62	4.39	1.00	4.75	1.00	4.06	0.61	1.61	X_6
0.59	0.59	-4.37	1.00	-5.34	1.00	4.44	0.89	1.41	X_7
0.35	0.35	9.6	0.55	9.79	1.00	8.83	0.80	5.61	X_8
0.33	0.33	-0.1	0.69	-3.98	1.00	1.1	0.89	0.72	X_9
0.31	0.31	4.89	0.37	5.7	0.74	1.51	0.92	0.75	X_{10}
0.30	0.30	9.64	0.62	12.28	1.00	2.7	0.68	1.08	X_{11}
0.35	0.35	5.98	0.83	6.57	1.00	1.98	0.80	1.19	X_{12}
0.38	0.38	-1.98	0.97	-3.17	1.00	2.91	0.94	0.61	X_{13}
0.27	0.48	0.57	0.56	-1.27	0.67	3.55	0.27	1.35	X_{14}
0.37	0.37	12.65	1.00	12.83	1.00	2.78	0.80	2.01	X_{15}
0.18	0.18	1.06	0.59	2.99	0.95	0.25	0.65	0.09	X_{16}
0.15	0.15	2.72	0.29	2.78	1.00	10.62	0.99	1.39	X_{17}
0.10	0.10	10.6	0.52	17.15	0.84	0.73	0.55	0.54	X_{18}

Table 5: Companies Final Ranking

Company	Degree	Rank
X_2	0.69	1
X_1	0.66	2

X_3	0.65	3
X_6	0.61	4
X_4	0.59	5
X_7	0.47	6
X_5	0.47	7
X_{13}	0.38	8
X_{15}	0.37	9
X_8	0.35	10
X_{12}	0.55	11
X_9	0.33	12
X_{10}	0.31	13
X_{11}	0.30	14
X_{14}	0.27	15
X_{16}	0.18	16
X_{17}	0.15	17
X_{18}	0.10	18

Conclusion

In this research, we firstly rank companies by utilizing Tavakkoli *et al.* (2010) approach by using financial ratios as our criteria. The result of the analysis found that X_2, X_1, X_3, and X6 companies according to selective criteria are among the best companies in the industry according to their respective financial performance. The results obtained from this approach are consistent with the expectation of the financial experts in Bursa Malaysia about property industries in Malaysia. Hence the fuzzy logic approach could be used as an alternative approach in solving the problems that involve uncertainty. To extend this effort we propose that further research to be conducted in order to improve the right criteria, which could improve the performance of the proposed model.

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